

Nightscape

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From the Executive Director

This issue's striking cover image of the luminescent sea and soaring Milky Way transported me back thirty years.

I spent a glorious summer working in the Sultanate of Oman at the foot of the Arabian Peninsula. On one memorable weekend, we headed along the coast to camp by the ocean. As night fell, I started to glimpse a sparkle in the waves. Slipping into the warm waters to swim was magical. Each stroke or splash glowed with the bioluminescent light of countless algae and other marine creatures. This sea sparkle made the ocean glow and glitter as if lit by the light of a thousand stars.

Today these experiences are lost to most people. They assume that the night is a dark place to be lit by bright outdoor lights in the name of safety. Doing so robs the world of so much. Light pollution hurts human health, harms wildlife, and disrupts our climate. We need to reclaim the night sky.

At DarkSky, we are committed to partnering with lighting designers, manufacturers, standards-setting bodies, policymakers, communities, and you

to promote responsible light at night. Following our principles for responsible light at night (see back page), you can create safe, welcoming spaces to be at night. And typically, by using less, you also save money. But it does so much more. It's good for human health, promotes animal well-being, and reduces energy demand.

Please take inspiration from the beautiful collection of photos in this issue to rekindle your connection to natural darkness. When you do, hop on to our new and improved website — DarkSky.org — where you'll find tips, tools, resources, and guides to how you can do your part to reclaim the night sky.

And please let me know what you are doing so we can share your success stories with the DarkSky community worldwide.



For the night,
Ruskin Hartley
ruskin@darksky.org
Tucson, Arizona, U.S.

On the cover



Creatures of the Night CATEGORY

**"Milky Way Above the Turquoise
Wonderland"**
by Petr Horálek
Maldives

"Light pollution doesn't just erase our view of the stars. Scientific evidence shows that artificial light at night has deadly effects on wildlife, including amphibians, birds, insects, and mammals. Bioluminescent plankton belong to night nature all around the world as part of the natural ecosystem. If not disturbed by artificial light, they help to preserve the rich ecosystem, as protection but also as food. Plus, with no light pollution, you can enjoy such wonderful natural light at night."

TECHNICAL DETAILS

Single exposure | Canon Ra | Lens:
Samyang 24mm | Aperture: 2.2 | ISO:
5000 | Shutter speed: 15s

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From the Editor



Frank Vincenz / CC BY-SA 4.0

Humans have been creating pictures of the night sky for millennia. Wall paintings in France's Lascaux Caves, for example, illustrate a comet event around 15,200 BCE. Some of the world's most recognizable artworks depict the night sky, from Van Gogh's "The Starry Night" to the 3,600-year-old Nebra sky disc — the earliest known depiction of the cosmos. I had the privilege of seeing the latter in person last year at a special exhibition at the British Museum. I was entranced: a basketball-sized bronze disc inlaid with gold symbols thought to represent the Sun, Moon, stars, solstices, and the Pleiades asterism, created by ancient people.

A view of the cosmos has been fundamental to the human experience for all of history. It was important for the practical reasons of tracking the seasons and for the artistic reasons of awe, beauty, and emotion. Light pollution threatens these most fundamental expressions of being.

The pages of this issue celebrate the importance of nighttime art through the winning images of DarkSky's annual Capture the Dark photo contest. Also inside, you'll find the annual impact report for 2022 and global news from our passionate DarkSky Advocates.

Note on the previous issue

The cover of our June 2023 issue featured a photo (a previous contest winner) of a child holding a net with a string of solar lights. Thanks to one reader who pointed out they could appear to be fireflies and inquired whether this might be harmful. DarkSky is deeply committed to protecting and restoring the natural night for all creatures who call it home. According to experts at the Nature Conservancy, catching

fireflies in a net is not harmful as long as it is done appropriately and they are released afterward. With the support of our editorial team, I do my utmost to consider every



image and word we publish in *Nightscape* carefully. We believe that respectfully observing nocturnal creatures is vital to people's sense of

awe of the natural world. We appreciate your passion and care for the night and always welcome feedback and the chance to listen and learn.



Megan Eaves
nightscape@darksky.org
 London, U.K.

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DarkSky's 2023 Capture the Dark Photo Contest Winners

Photography plays a powerful role in connecting those who've never laid eyes on a naturally dark night to a universe hidden behind the veil of skyglow. Similarly, images that portray the impact of light pollution can spark conversation, awareness, and action. In celebration of the power of photography to transport and inspire us, DarkSky hosted the fourth annual Capture the Dark photography contest, presented by Visit Utah.

This year we had nearly 500 submissions from photographers around the world. The images were judged by an international panel of talented astrophotographers. We're pleased to feature the winning photographs from each of the contest's 10 categories:

1. Deep Sky
2. Connecting to the Dark
3. Bright Side of Lighting
4. Impact of Light Pollution
5. International Dark Sky Place
6. Mobile Photographer
7. Youth
8. People's Choice
9. Utah Dark Skies
10. Creatures of the Night (on the cover)



1 Deep Sky

For thousands of years, humans have looked to the night sky and wondered what is out there. Today, we can take photos of deep-space objects, such as nebulae, galaxies, and star clusters, from our own backyards.

“The Celestial Spider Web”

by Zubuyer Kaolin

El Sauce Observatory

“The Tarantula Nebula is a bright starburst region in the Large Magellanic Cloud. It is only visible from the Southern Hemisphere, so to capture it, I acquired some observation time from a remote observatory in Chile. Because of the dark Bortle 1 sky in that region, I was able to capture this intricate image in the Hubble Palette [processing technique] showcasing ionized hydrogen, sulfur, and oxygen gas. The resulting image fills me with a childlike sense of awe and wonder.”

Technical details: Subframe | Aperture: f/3.8 | Shutter Speed: 300 seconds per subframe

2 Connecting to the Dark

Experiencing a natural night provides perspective and inspiration and leads us to reflect on our humanity and place in the universe.

“The sky is like a dome, covering field”

by Wang Tianwei

Haisen Chulu, Alashan Right Banner, Inner Mongolia

“Just before and after the maximum of the Perseid meteor shower, I looked up at the Milky Way on a Sunday and the meteor radiated from the position of Perseus through the whole sky. The fisheye projection effect is the best way to show all of this.”

Technical details: Single Exposure | Nikon D800 | Lens: Sigma 14 1.8 art | Aperture: f/1.8 | ISO: 2000 | Shutter speed: 60 sec



3 Bright Side of Lighting

Light pollution can give artificial lighting a bad reputation, but lighting that follows DarkSky's Principles for Responsible Outdoor Light can be beautiful, healthy, and functional.

"My neighborhood"

by Celeste Boudreaux

Tucson, Arizona

"This photo shows my neighborhood adhering to dark sky measures. You will notice our outdoor lights have covers on them. My house isn't in this image, but I even use red lights under my covers. These measures allow us to see the Milky Way with the naked eye even though we are a suburb of Tucson, a big city."

Technical details: Blend | Lens: Viltrox 13mm | Aperture: F1.4 | ISO: 400 | Shutter speed: 60 sec





4 Impact of Light Pollution

Light pollution can have significant impacts on the environment, human health, and our access to the night sky. This category also includes images of terrible lighting, glare bombs, etc.

“Dark’ skies in the mountains?”

by Constantine Themelis

Tre Cime di Lavaredo

“After a long day of enjoying and photographing the Italian Alps, I decided to capture a wide panorama to show you how beautiful Tre Cime is. The combination of the wild airglow, the coming clouds, and the light from Rifugio Locatelli made the whole scene really special. However, it really hit me that even up in the mountains, I could not find pure dark skies. Tourism is expanding at a wild and unstoppable rate. You can clearly see the yellow glow of the ‘nearby’ hotels spreading for hundreds of kilometers. So, what’s next?”

Technical details: 10-image Panorama | Camera: Canon EOS Ra | Lens: Sigma 28mm f1.4 | Aperture: f1.4 | ISO: 1600 | Shutter speed: 10 sec



5 International Dark Sky Place

Over 200 protected lands and municipalities around the world have been certified by DarkSky as International Dark Sky Places, creating havens for astrophotographers.

“Lily’s Whisper”

by Ethan Su

Hehuan Mountain Dark Sky Park

“The fragrance of the lily attracts night moths dancing in the air. Mist covers the stars in the Milky Way, one after another, and the gentle breeze carries fresh floral scents on this pleasant summer night. It was unexpected to find lily blossoms above 3,000 meters (9,842 ft) in altitude in the summer while I was scouting for a new photography spot in Hehuan Mountain Dark Sky Park.”

Technical details: Blend | Sony A7R4 | Aperture: Foreground: f8, Sky: f2.8 | Foreground ISO1250; Sky ISO800 | Shutter Speed Foreground: 1/30; Sky: 240 sec *3 shots & stacked for noise reduction





6 Mobile Photographer

No big camera? No problem! Shots from any of the above categories taken with a cell phone, tablet, or GoPro. No DSLR, mirrorless cameras, or drone shots.

“Dragon in the Magic Tree”

by **Chen Bin**

Lijiang, Yunnan

“I never thought that my mobile phone could take such a picture of the starry sky with a single shot. I found such an angle of Jade Dragon Snow Mountain at night. In winter, M31 and Cassiopeia slowly fell to the top of Jade Dragon Snow Mountain in the northwest, and I took this picture through a strange dead tree.”

Technical details: Single Exposure | Mobile device: vivo X90 Pro+ | Aperture: f1.8 | ISO: 4000 | Shutter Speed: 32 sec



7 Youth

A shot for any of the above categories taken by someone 17 years old or younger.

“The Green Comet”

by **Carl Crum**

San Carlos, California

“As transitory as a comet, childhood flies by at an astonishing speed. Indeed, when I consider my growth as an astrophotographer, I find it difficult to believe that several years ago, I had never even considered attaching my camera to a telescope and documenting celestial phenomena. Fortunately, comets like the one in this photo – C/2022 E3 (ZTF) – shine brightest when they approach the sun, a metaphor for how I intend to approach the blazing tribulations of adulthood. However, for the remainder of my youth, I will enjoy my ride around the sun and gaze fondly upon the cosmos.”

Technical details: Stacked | Lens: Takahashi FSQ-106 | Aperture: F5 | ISO: Gain 20 | Shutter speed: 85 x 60s (1 hr 25 min)





8 People's Choice

Chosen by our community of dark sky supporters, this photo received the most votes in a public poll.

"Inesperado Meteoro"

by Juan López Hoyos

Monument Valley, Utah

"Me es fascinante fotografiar la vía láctea. Hacia una panorámica de su arco y repentinamente surca el espacio un gran y brillante meteoro. Asombrado por verle, giré la cámara hacia donde se encontraba y pude fotografiarlo con la espectacular vía láctea de fondo. Sin duda, un momento maravilloso e inolvidable que se dio al estar conectado con el universo."

"I find it fascinating to photograph the Milky Way. I took a panorama of its arc and suddenly a great and bright meteor streaked through. Amazed to see it, I turned the camera and was able to capture it with the spectacular Milky Way in the background. Without a doubt, a wonderful and unforgettable moment that happened by being connected with the universe."

Technical details: Single Exposure | Canon EOS 5D Mark IV | Aperture: f/1.8 | ISO: 3200 | Shutter Speed: 15 sec

9 Utah Dark Skies

Presenting Sponsor Visit Utah celebrates a photo taken in one of the most popular destinations to capture dark skies: Utah.

"Desert Bloom"

by Marcin Zajac

Goblin Valley, Utah

"Taken in Goblin Valley State Park, an International Dark Sky Park."

Technical details: Blend | Camera Body: Nikon D810 | Camera Lens: Tamron 15-30 | Aperture: f2.8 | ISO: 800 | Shutter Speed: 2 min

DarkSky Board of Directors

- Tom Reinert, President, U.S.
- Nalayini Brito-Davies, Vice-President, New Zealand
- Brad Schlesselman, Treasurer, U.S.
- Ken Walczak, Secretary, U.S.
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- Charles Mudd, General Counsel, U.S.
- Ruskin Hartley, CEO and Executive Director, U.S.

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- Nancy Clanton, U.S. and Terry McGowan, U.S. — Technical Committee
- Dan Oakley, U.K. — Dark Sky Places Committee
- Dajana Bjelajac, Serbia — Awards Committee

Special thanks

DarkSky’s Brand Partners are dedicated members of the dark sky protection community from corporate and business sectors. They support programs, outreach, education, and nocturnal conservation efforts. These companies made philanthropic contributions from 1 January 2022 through 31 July 2023.

- Crossroads LED
- Earth Sun Moon Trading Company
- Holiday River Expeditions
- Inside Editions — EarthAware
- Landscape Forms
- Lowe’s
- Musco
- Rémy Martin
- The Home Depot
- Under Canvas
- Visit Utah
- Your True Nature

DarkSky International 2022 Impact Report

President’s message

A little boy named Orion, our fifth grandchild, was born in December 2022. In January 2023, I became President of DarkSky International. That same month, the magazine *Science* published an article by our colleagues Chris Kyba and Connie Walker that analyzed data from the Globe At Night

other cities suffered under severe and health-threatening air pollution. But today, thanks to the passionate work of advocates and environmental activists, water and air are the cleanest they have been in a century, even with 75% more people in the United States. I believe we can achieve a similar outcome with light pollution.



“Will my grandson Orion and other children of his generation grow up seeing the Orion constellation?”

project based on citizen scientists’ observations of the Orion constellation. They found that light pollution is increasing at a rate of 10% per year — a rate at which, in 20 years, we will lose the night sky.

This issue is personal for me. Will my grandson Orion and other children of his generation grow up seeing the Orion constellation? Will they enjoy the biodiversity of spotting fireflies? Will they have good health free from the adverse consequences of light pollution?

Light pollution is a solvable environmental problem. As recently as 1969 (the year of the Apollo Moon landing), we faced other environmental hurdles: Lake Erie caught on fire in Cleveland, Ohio, while Los Angeles and

DarkSky International has responded to these urgent findings with a new strategic plan, a fresh brand, and a renewed commitment to protecting and regenerating the natural night through worldwide policy changes. Our efforts have already expanded global awareness of light pollution, which did not exist just five years ago. Now we must convert awareness into action. We can restore the night but it depends on you, our network of Advocates and supporters, working diligently around the world.

Now is the time to save the natural night. You are the ones who can do so.

Tom Reinert
President, DarkSky International
Virginia, U.S.

Reach

196,560

supporters and members from

61

countries around the world

Conservation

◆ 160,798 square kilometers of protected land in 23 countries on 6 continents

◆ 195 total International Dark Sky Places; 7 new in 2022:

1. Greater Big Bend International Dark Sky Reserve — Texas, U.S.
2. City of Blanco Dark Sky Community — Texas, U.S.
3. Jelsa Dark Sky Community — Croatia
4. Keweenaw Dark Sky Park — Michigan, U.S.
5. Lost Trail National Wildlife Refuge Dark Sky Park — Montana, U.S.
6. Parc du Mont-Bellevue Urban Night Sky Place — Québec, Canada
7. Merritt Reservoir Dark Sky Park — Nebraska, U.S.

◆ 1 new country added to the program (México)

Engagement

◆ International Dark Sky Week reached an unprecedented audience of at least one million people in at least 83 countries around the world, with 176 events submitted.

◆ The 2022 Under One Sky global conference welcomed more than 2,140 participants from 78 countries in a 24-hour virtual event.

◆ The DarkSky Approved program brought in 15 new lighting companies in 2022 for a total of 1,199 registered companies.

◆ Nearly 1,200 entries were submitted to our 2022 Capture the Dark photography contest reaching participants in 132 countries.

Empowering Chapters and Advocates

◆ Led by DarkSky Chapters and Delegates worldwide, our engagement programs reached more than 12 million through online offerings and 46,150 events.

◆ DarkSky now has advocate representation from 82 countries with Advocates on six continents.

◆ DarkSky Advocates and Delegates around the world together contributed more than 31,000 volunteer hours of work on dark sky protection in 2022 through outreach events, chapters, advocacy with policymakers and governments, media interviews, and the important grassroots work to help protect the night for future generations.

Advancing Policy and Science

◆ With support from DarkSky Advocates across Europe, the Brno appeal to reduce light pollution in Europe was adopted in November 2022.

◆ A paper by DarkSky Board of Directors members Kevin Gaston and Alejandro Sánchez de Miguel reviewed the environmental impacts of artificial light at night and offered a fresh approach to the use of light at night.

◆ Maui County Council in Hawaii passed a bill mandating that outdoor lighting restrict blue light, be pointed downward, and be shielded, ensuring no light shines over the ocean.

◆ An economic study conducted at Mont-Mégantic International Dark Sky Reserve in Canada showed that dark sky protection efforts are a major driver of tourism and job creation, with benefits of around \$13.8 million per year.

◆ In Pakistan, the Sustainable Development Policy Institute held a webinar on dark sky protection, with presentations by DarkSky Advocate Rayan Khan and representatives from Pakistan’s National Energy Efficiency & Conservation Authority, Ministry of Climate Change, the Clean Lighting Coalition, and the International Astronomical Union.

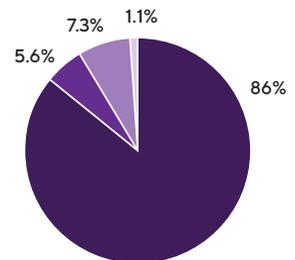
◆ Thanks to the efforts of DarkSky Advocate Susan Harder, New York state lawmakers introduced legislation to limit outdoor lighting to protect migrating birds and Suffolk County passed an amendment to lower lighting color temperature.

◆ Work by DarkSky Advocates in Kansas City resulted in a streetlight conversion plan to use only 3,000 K dark sky-certified fixtures on all of its streetlights.

FY 2022 Statement of Financial Activity

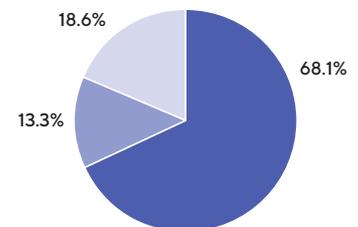
This information is based on Reviewed Consolidated Financial Statements for the year ending December 31, 2022. For more detailed financial information, please visit darksky.org/about/funding

REVENUE



● Individuals	\$1,781,366
● Corporations & Grants	\$117,199
● Program Revenue	\$150,737
● Other	\$22,530
Total Revenue	\$2,071,832

EXPENSE



● Program Services	\$932,148
● General Administrative	\$181,256
● Fundraising	\$254,814
Total Expense	\$1,368,218

Advocate highlights

News snippets from our worldwide network of Advocates and Delegates

A U.K.

Thanks to the work of Advocate **Hannah Dagleish** and evidence given by DarkSky Executive Director **Ruskin Hartley** and local Advocates, the U.K. House of Lords published a report stating that light pollution is a “neglected pollutant” that is “causing significant harm” to human health. It is calling on the U.K. government to set targets and a regulatory framework to reduce light pollution.

B India



Advocate **Minu Agarwal** hosted a six-day dark sky summer school at CEPT University in Ahmedabad, India with support from the country’s largest lighting manufacturer, Havells. Students evaluated lighting fixtures by taking measurements, conducting compliance checks, and comparing various light sources.

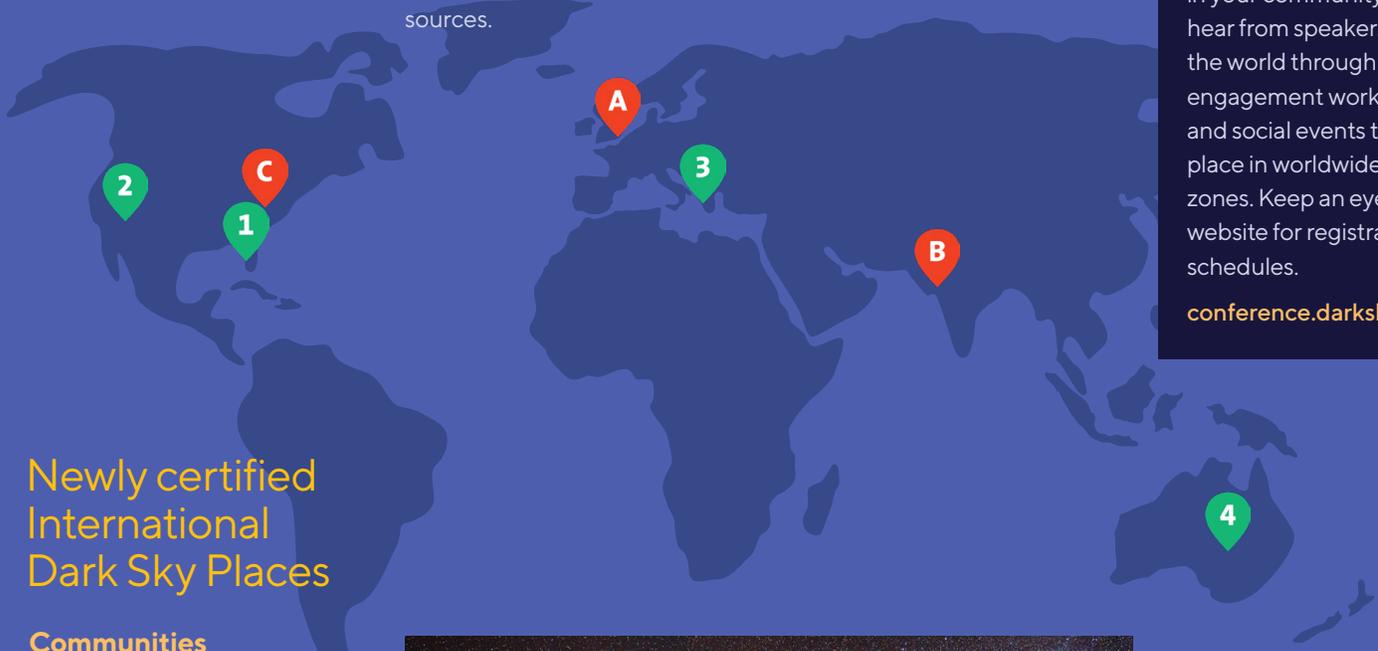
C Virginia, U.S.

Advocate **Eileen Kragie** held a successful outreach event at Wolf Trap National Park for the Performing Arts in Fairfax County, Virginia. She greeted members of the public with a display table on dark skies and light pollution during a National Symphony Orchestra performance of Holst’s “The Planets.” Some 6,000 people attended the event.



Don't forget that our annual conference, **Under One Sky 2023**, takes place on 3–4 November 2023. This 24-hour virtual event will leave you feeling inspired and empowered to combat light pollution in your community. You'll hear from speakers around the world through lectures, engagement workshops, and social events taking place in worldwide time zones. Keep an eye on the website for registration and schedules.

conference.darksky.org



Newly certified International Dark Sky Places

Communities

- 1 Groveland, Florida, U.S.
- 2 Springdale, Utah, U.S.

Parks

- 3 Aenos National Park, Kefalonia, Greece

Sanctuaries

- 4 Arkaroola Wilderness Sanctuary, South Australia

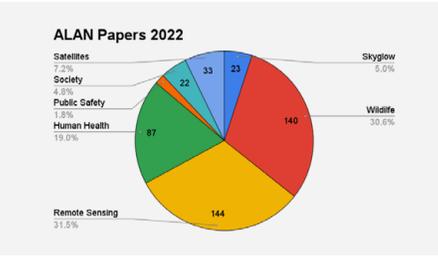


Arkaroola Wilderness Sanctuary

Tourism Australia / Morgan Settle

News & notables

News from the global movement to solve light pollution



State of the Science report

Our annual “Artificial Light At Night: State Of The Science” report has been released, providing a **summary of light pollution research** published in 2022. It distills more than 300 scholarly papers into short, easy-to-read summaries in seven categories: the night sky, ecological impacts, human health, public safety, energy use and climate change, light and social justice, and space light pollution. It concludes with several open questions that may guide future research. Read it:

bit.ly/sosreport2022



Defending the Dark

Director Tara Roberts Zabriskie and Dark Sky Maine released *Defending The Dark*, a **documentary film about dark sky protection in Maine** and what can be done to bring back the night sky. It has been shown on PBS and screened at several film festivals and at the American Astronomical Society meeting in June.

darkskyfilm.com



Become a Nighthawk!

DarkSky International offers memberships and programs like our monthly donation program, Nighthawk Giving Club. These regular gifts are critical to supporting our projects and advocacy work in protecting the



night sky. Get involved! Join the movement and become a Nighthawk today!



act.darksky.org/sustaining-membership



Drink in dark skies!

A great way to support DarkSky is to purchase our customized apparel, mugs, and totes.

bonfire.com/store/idadarksky

OVERHEARD

“This work is important for me simply because humans, animals, and plants have the right to live under the dark sky and benefit from its presence.”

– Nurul Syahirah Binti Nazarudin, Malaysia

New DarkSky website

Our new website is live! Our team has put countless hours of dedication and creativity into crafting a website that is beautiful, easy to use, and will empower our members, supporters, and Advocates with the information they need. Keep an eye out for more features launching soon.

darksky.org

IN CASE YOU MISSED IT

Cover story

A **special issue** of the journal *Science* was dedicated to light pollution in June (Vol



380, Iss 6650) with five feature articles and an opinion piece covering policy, measuring and monitoring light pollution, its effects on species and ecosystems,

urban environments, and problems for astronomy.

science.org/toc/science/380/6650





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Five Lighting Principles for Responsible Outdoor Lighting



DarkSky



Illuminating
ENGINEERING SOCIETY

Responsible outdoor lighting is

1 Useful

Use light only if it is needed

All light should have a clear purpose. Consider how the use of light will impact the area, including wildlife and their habitats.



2 Targeted

Direct light so it falls only where it is needed

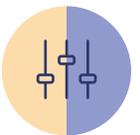
Use shielding and careful aiming to target the direction of the light beam so that it points downward and does not spill beyond where it is needed.



3 Low Level

Light should be no brighter than necessary

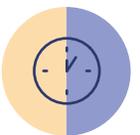
Use the lowest light level required. Be mindful of surface conditions, as some surfaces may reflect more light into the night sky than intended.



4 Controlled

Use light only when it is needed

Use controls such as timers or motion detectors to ensure that light is available when it is needed, dimmed when possible, and turned off when not needed.



5 Warm-colored

Use warmer color lights where possible

Limit the amount of shorter wavelength (blue-violet) light to the least amount needed.

